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SPECIFICATION FOR CORE GUMS (SODIUM SILICATE BASED) FOR USE IN FOUNDRIES

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SPECIFICATION FOR CORE GUMS (SODIUM SILICATE BASED) FOR USE IN FOUNDRIES

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Indian Standard

SPECIFICATION FOR CORE GUMS (SODIUM SILICATE BASED) FOR USE IN FOUNDRIES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 10 February 1978, after the draft finalized by the Foundry Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 In any foundry it is always found necessary to join two or more cores together before using them for setting in mould making. The joining may be done either in warm or in cold condition. The adhesive material used for the purpose is called core gum, core joining paste, core paste, core cement, core fix, core grip, etc. In general there are two types of gums used: (a) where bonding is given by an organic adhesive like dextrine, resinous material, glue, etc; and (b) where bonding is given by sodium silicate. The first type of gum is normally prepared inside the foundries and used within a few hours of making as the storage qualities are normally poor. These gums have basically a higher gas content. The second type is normally supplied by foundry chemical manufacturers based on proprietary formulations and normally has a very long life in sealed containers. These specifications apply to silicate base core gums.

0.2.1 Quality of the core gum in terms of its rate of bonding and strength developed, hygroscopic properties and gas content is important in regard to both the foundry manufacturing process and casting defects produced.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements for sodium silicate based core gums for use in foundries.

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*Rules for rounding off numerical values (*revised*).

2. GRADES

2.1 Depending upon the rate of setting there shall be two grades of core gums; namely, slow setting, and fast setting.

NOTE — Cores joined by a slow setting gum in cold condition are movable for about an hour to enable jigging or adjustments. Fast setting gum is required when core assemblies are to be moved within about 20 minutes.

3. SUPPLY OF MATERIAL

3.1 General requirements relating to supply of core gums for use in foundries shall be as laid down in IS : 1387-1967*.

4. MANUFACTURE

4.1 The core gum shall be manufactured by thoroughly mixing sodium silicate liquid with filler material, like fireclay, chinaclay, soapstone, bentonite, silica flour, finally divided asbestos powder, etc, to give a smooth paste of desired consistency. The exact formulations shall be developed and decided by the manufacturers which may be divulged to the consumer, if agreed to between the purchaser and the manufacturer.

5. REQUIREMENTS

5.1 Viscosity — It is the capacity of core gum to flow under its own pressure and can be conveniently measured by D-4 viscosity cup after known dilution of the core gum with water.

5.1.1 The requirements for viscosity may be agreed to between the purchaser and the manufacturer.

5.2 Setting-Strength Properties — Core gums, when tested in accordance with the procedure given in Appendix A, shall meet the requirements of air-set tensile strength, baked tensile strength and hygroscopic strength properties as specified in Table 1. Air-set tensile strength and baked tensile strength are measures of the rate of strength developed and ultimate strength developed respectively. The drop in tensile strength in the humid conditions of the set gum is the measure of the susceptibility to absorb moisture.

5.3 Gas Content — This is a measure of the gas generated during pouring of castings containing gum-joined cores. The testing shall be done as specified in IS : 1918-1966†, the specimen being dried core gum powder obtained by heating a small quantity of sample to constant mass at 100 to 110°C.

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*General requirements for the supply of metallurgical materials (*first revision*).
†Methods of physical tests for foundry sands.

5.3.1 Gas content when determined in accordance with the procedure specified in Appendix A shall not exceed the values specified in Table 1.

TABLE 1 REQUIREMENTS FOR CORE GUMS

(*Clauses* 5.2 *and* 5.3.1)

SL No.	PROPERTY	GRADE	
		Slow Setting	Fast Setting
(1)	(2)	(3)	(4)
i)	Air-set tensile strength:		
	1 hour	—	0·3-0·6 MPa
	2 hours	0·3-0·7 MPa	0·6-1·00 MPa
	4 hours	0·9-1·4 MPa	1·0-1·7 MPa
ii)	Baked tensile strength	2·4 MPa *Min*	2·4 MPa *Min*
iii)	Hygroscopic properties (Tensile strength tested after keeping a baked test piece in a water saturated desiccator for specified period):		
	8 hours	0·3 MPa *Min*	0·7 MPa *Min*
	24 hours	0·07 MPa *Min*	0·2 MPa *Min*
iv)	Gas content ml/g	25 *Max*	25 *Max*

NOTE — 1 MPa = 1 N/mm^2 = 1 MN/m^2 = 0·1020 kgf/mm^2.

5.4 Wettability — The tensile specimen joined as specified in **A-1.2** on separation shall not show unwetted core surface area more than 10 percent.

6. SAMPLING

6.1 Sampling and testing shall be done on batch or lot basis. Representative samples shall be drawn from at least 5 percent of the number of containers in a particular batch of the supply after thorough mixing of the material. The composite samples shall be thoroughly remixed and reduced for testing.

7. PACKING

7.1 The core gum shall be supplied in air-tight steel or plastic containers of 2 or 5 kg capacity. It is preferable to have least number of batches in a particular supply to facilitate testing and inspection. This number shall be as agreed to between the purchaser and the manufacturer.

7.1.1 Other modes of packing may be mutually agreed upon at the time of enquiry and order.

8. MARKING

8.1 The containers shall be clearly marked with the grade of the core gum, manufacturer's name or trade-mark and batch number. Expiry date also shall be marked as a guide to the consumer of the expected shelf life of the product.

8.1.1 The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

APPENDIX A

(*Clauses* 5.2, 5.3.1 *and* 5.4)

TESTING PROCEDURE FOR CORE GUM

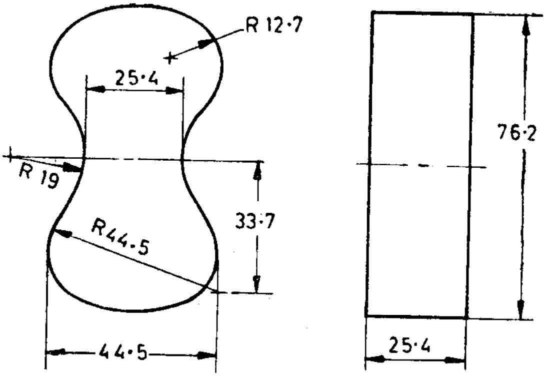
A-0. OUTLINE OF THE METHOD

A-0.1 This test is intended to determine whether a core gum meets tensile requirements. In general, the test is performed by applying the core gum between two hard wood blocks or two-halves of a briquet core specimen, allowing the paste to dry for a specified length of time under specified conditions and measuring the tensile load necessary to separate the blocks or core halves.

A-0.2 In this standard, core specimens are used for gum testing as these similate the shop practice.

A-1. TESTING PROCEDURE

A-1.1 Specimen Used — The standard briquet core described in Fig. 1 shall be used to measure the tensile strength of core paste. The briquet cores used in making this test shall be made from a core sand mixture having a minimum baked tensile strength of 2·5 MPa (specimens must be prepared in a manner and from the mixture that, after baking, they will be stronger than the core gum).



All dimensions in millimetres.

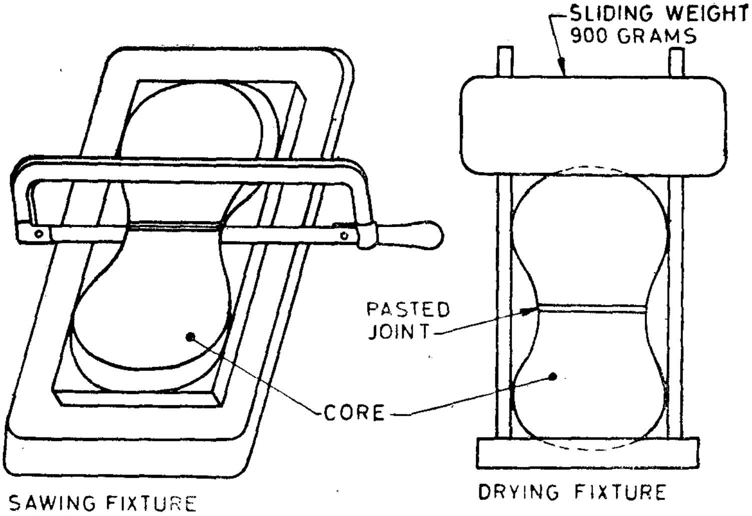
FIG. 1 TEST SPECIMENS FOR TESTING TENSILE STRENGTH OF CORE SAND MIXTURE

A-1.1.1 The fineness of the sand, and core mixture baking time and temperature used to make the test cores shall be recorded as data. After a core test briquet has been made, baked and cooled in a desiccator to room temperature, it shall be sawed into two-halves with the aid of the sawing fixture as shown in Fig. 2. After the specimen has been sawed, brush any loose sand from the sawed sections and smoothen the surfaces by suitable file or emery paper.

A-1.2 Application and Drying of Gum — Mix the gum thoroughly to uniform consistency. Apply the mixed gum to the sawed faces of the briquet core in the same manner used in foundry practice. Place the sawed faces of the specimen carefully together making sure that the sawed surfaces line up exactly in the drying fixture as shown in Fig. 2. Adjustment of the two pieces shall be exact. Excess gum squeezed out during load application shall be wiped off. The time of application of load shall be 2 minutes.

A-1.2.1 Dry the pasted specimen in an oven at a temperature of 220 ± 5°C for 30 minutes for measurement of baked tensile strength and in air for different times for air-set tensile strength. If the specimen is dried in an oven, allow it to cool in desiccator to room temperature before testing. If the specimens are air-dried at room temperature, all sample core gums shall be tested simultaneously under the same conditions.

A-1.3 Testing Procedure for Tensile Strength — Determine the tensile strength required to break the gum bond, using the equipment specified



All dimensions in millimetres.

FIG. 2 FIXTURES FOR DETERMINING TENSILE STRENGTH OF CORE PASTE — DRYING FIXTURE (RIGHT) AND SAWING FIXTURE (LEFT)

for determining the tensile strength of core mixtures (*see* **24.3** of IS : 1918-1966*). Record the strength required to break the gum bond in MPa.

A-1.4 Test for Hygroscopic Properties — Baked specimen prepared as under **A-1.2.1** is kept in water saturated desiccator for specified time (8 hours to 24 hours) and tensile strength is tested as given in **A-1.3**.

A-1.5 Gas Content Measurement — The gas content of core gum shall be determined in accordance with the procedure given in IS : 1918-1966*, using a sample of the core gum dried to constant mass at 110 ± 5°C.

A-1.6 Recording of Data — Perform at least five tests, recording data for each test. Test results which are manifestly faulty, or which give strengths differing more than 15 percent from the average value of all tests, made from the same sample and broken during the same test period, shall not be considered in determining the tensile strength of the paste. The average of the acceptable values shall be reported as the tensile strength of the paste.

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*Methods of physical tests for foundry sands.

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1513-1971	Pattern equipment for foundries (*first revision*)
1752-1973	Coal dust for use in cast iron foundry (*second revision*)
1811-1961	Methods of sampling foundry sands
1918-1966	Methods of physical tests for foundry sands
1987-1974	High silica sand for use in foundries (*first revision*)
3339-1975	Silica flour for use in foundries (*first revision*)
3343-1975	Natural moulding sand for use in foundries (*first revision*)
3666-1966	Tests for foundry core oils requiring baking
4140-1967	Limestone for use in foundries
4269-1967	Dextrin for use in foundries
4475-1975	Crane-suspended hand-operated geared ladles for iron foundries (*first revision*)
4476-1975	Crane-suspended hand-operated geared ladles for steel foundries (*first revision*)
4604-1975	Pattern plates for machine moulding boxes (*first revision*)
4606-1968	Steel shot for use in foundries
4683-1968	Chilled iron shot and grit for use in foundries
4981-1975	Guide pins for foundry pattern plates (*first revision*)
4982-1975	Closing pins for foundry moulding boxes (*first revision*)
5032-1975	Recommended sizes of cupola furnace for foundry (*first revision*)
5303-1974	Zircon flour for use in foundries (*first revision*)
5824-1970	Lancets for use in foundries (*first revision*)
5841-1970	Fluted core cleaners for use in foundries
5850-1970	Star (triangular) cutters for use in foundries
5873-1970	Steel cut-wire shots for use in foundries
5904-1970	Chaplets for use in foundries
5981-1970	Sleekers for use in foundries
5988-1970	Spring dowel sleeves (light and heavy patterns) for use in foundries
6013-1970	Trowels for use in foundries
6366-1971	Sprue plugs for use in foundries
6376-1971	Pattern lifting pins and hooks for use in foundries
6377-1971	Mallets for use in foundries
6378-1971	Pattern lifting and rapping plates
6401-1971	Dowel pins for use in foundries
6443-1971	Lifters and cleaners for use in foundries
6447-1971	Vent wires for use in foundries
6482-1971	Tampers and rammers for use in foundries
6773-1978	Sodium silicate for use in foundries (*first revision*)
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7295-1974	Chamotte
7297-1974	Olivine sand and flour for use in steel foundries
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8228-1976	Bauxite sand
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